

Notice of Allowability

Application No.

10/765,126

Applicant(s)

JEONG ET AL.

Examiner

Sanh D. Phu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the Amendment filed on 2/1/2007.
2. ☒ The allowed claim(s) is/are 1-21.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

DETAILED ACTION

1. This Office Action is responsive to the Amendment filed on 2/1/07.

Accordingly, claims 1-21 are currently pending.

EXAMINER'S AMENDMENT

2. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Attorney Michael Parker on 04/11/07.

The application has been amended as follows:

IN THE CLAIMS:

Claims 1-21 are amended as follows:

1. (Currently amended) A multi-sector in-building repeater in communication with a base station, the multi-sector in-building repeater comprising:

a master transmitting unit for receiving multi-sector signals of a carrier frequency from the base station, mixing the multi-sector signals with different

transmission intermediate frequency signals, and outputting the mixed multi-sector signals to a same transmission line;

a plurality of slave transmitting units, each of which receives the mixed multi-sector signals, for extracting from the mixed multi-sector signals sector signals assigned to the multi-sector signals from the [master transmitting unit] transmission line, converting the extracted sector signals into high frequency signals, and transmitting [converted] the high frequency signals through an antenna;

a plurality of slave receiving units for mixing different receiving intermediate frequency signals with [the] sector signals of carrier frequencies received from the antenna, converting the mixed signals into multi-sector signals of different receiving intermediate frequency bands, and outputting the converted [sector] signals to [a] the same transmission line;

a master receiving unit for mixing the multi-sector signals [at] received from the plurality of slave receiving units, the multi-sector signals having been transmitted through the same transmission line from the plurality of slave receiving units and converted into different receiving intermediate frequency

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band signals, with different intermediate frequency band signals, separating each of the [sector] mixed multi-sector signals, converting the separated [sector] multi-sector signals into receiving carrier frequency signals, and outputting the converted signals to the base station;

a master transmitting/receiving separator for separating transmitted/received signals of the master transmitting unit from transmitted/received signals of the master receiving unit; and

a distributor for distributing [received] the mixed multi-sector signals received from the master transmitting unit to the plurality of [slave receiving] slave transmitting units, receiving the multi-sector signals of different receiving intermediate frequency bands provided [sector signals being converted into receiving intermediate frequency band signals] from the plurality of slave receiving units, and transmitting [converted sector signals] the multi-sector signals of different receiving intermediate frequency bands to the master receiving unit.

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2. (Currently amended) The repeater according to claim 1, wherein the master transmitting unit comprises:

a plurality of mixing units for receiving [assigned carrier frequency sector signals] the multi-sector signals of the carrier frequency from the base station, mixing the received [sector] multi-sector signals with the different transmission intermediate frequency signals, and outputting the mixed [sector] signals; and

a plurality of amplifying units for filtering off unnecessary signals from the output signals of the mixing units, [the sector signals having been converted into different transmission intermediate frequency signals,] for amplifying the [sector] filtered signals without the unnecessary signals to a predetermined level, and for outputting the amplified signals to [a] the same transmission line.

3. (Currently amended) The repeater according to claim 2, wherein each of the mixing units comprises:

an attenuator for receiving [high frequency sector signals of an assigned carrier frequency] the multi-sector signals of the carrier frequency received

from the base station, attenuating the received [high frequency sector] multi-sector signals, and outputting the attenuated [high frequency sector] multi-sector signals; and

a mixer for mixing the attenuated [carrier frequency sector] multi-sector signals [at] provided from the attenuator with signals having frequency values equal subtraction results of [subtracted] different transmission intermediate frequency band signals from the carrier frequency, and outputting the [converted sector] mixed multi-sector signals into the different transmission intermediate frequency band signals to each of the amplifying units.

4. (Currently amended) The repeater according to claim 2, wherein each of the amplifying [unit] units comprises:

a band-pass filter for filtering off the [converted sector] mixed multi-sector signals into different transmission intermediate frequency band signals provided from the mixing units; and

an amplifier for amplifying the filtered [sector] signals [through] received from the band-pass filter to a predetermined level, and outputting the amplified [sector] signals to [a] the transmission line.

5. (Currently amended) The repeater according to claim 1, wherein the slave transmitting unit comprises:

a sector signal extracting unit for extracting different transmission intermediate frequency band signals from [receiving] the [converted] mixed multi-sector signals [into different transmission intermediate frequency signals] provided from the master transmitting unit, mixing the different transmission intermediate frequency band signals into sector signals to be extracted out of the [received] mixed multi-sector signals with signals having [subtracted] frequency values equal subtraction results of a predetermined value from the transmission intermediate frequency signals, and extracting the sector signals; and

a high frequency signal generating unit for converting the extracted sector signals [at] received from the sector signal extracting unit into the high

frequency signals, and transmitting the converted signals through [an] the antenna.

6. (Currently amended) The repeater according to claim 5, wherein the sector signal extracting unit comprises:

a first band-pass filter for filtering off the multi-sector signals having been converted [to] into the different transmission intermediate frequency band signals provided from the master transmitting unit;

a mixer for receiving the filtered multi-sector signals from the first band-pass filter, mixing the filtered multi-sector signals into sector signals to be extracted out of the multi-sector signals with signals having [subtracted] frequency values equal subtraction results of [a] the predetermined value from the [mixed] transmission intermediate frequency signals, and outputting the mixed signals; and

a second band-pass filter for filtering off the output signals of the mixer, and extracting a desired sector signal.

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7. (Currently amended) The repeater according to claim 5, wherein the high frequency signal generating unit comprises:

a high frequency generator for generating the high frequency signals by mixing the sector signals extracted through the sector signal extracting unit with signals having [subtracted] frequency values equal subtraction results of a predetermined value from the [base station] carrier frequency; and

a power amplifier for amplifying power of the high frequency signals provided by the high frequency generator, and transmitting the amplified signals through [an] the antenna.

8. (Currently amended) The repeater according to claim 1, wherein the slave receiving unit comprises:

an intermediate frequency generating unit for generating intermediate frequency signals by mixing [receive carrier frequency sector signals] the received sector signals of carrier frequencies provided through the antenna with the assigned [receive] receiving intermediate frequency signals; and

an amplifier for filtering off the intermediate frequency signals generated by the intermediate frequency generating unit, and amplifying the filtered intermediate frequency signals to a predetermined level.

9. (Currently amended) The repeater according to claim 8, wherein the intermediate frequency generating unit comprises:

an amplifier for amplifying [receive carrier frequency sector signals] the received sector signals of carrier frequencies provided through the antenna to a predetermined level;

a band-pass filter for filtering the [receive carrier frequency sector signals] received sector signals of carrier frequencies being amplified by the amplifier; and

a mixer for mixing filtered [receive carrier frequency sector signals] sector signals of carrier frequencies provided from the band-pass filter with signals having [subtracted] frequency values equal the intermediate frequency signals from a receive carrier frequency.

10. (Currently amended) The repeater according to claim 8, wherein the amplifying unit comprises:

an amplifier for amplifying the intermediate frequency [band sector] signals provided by the intermediate frequency generating unit to a predetermined level; and

a band-pass filter for filtering off the amplified intermediate frequency [band sector] signals from the amplifier, and transmitting the filtered signals to the master receiving unit.

11. (Currently amended) The repeater according to claim 1, wherein the master receiving unit comprises:

a plurality of sector signal separating units for [receiving converted] extracting the multi-sector signals into the different [receive] receiving intermediate frequency band signals provided from the plurality of slave receiving units, mixing the receiving intermediate frequency band signals into sector signals to be extracted with signals having [subtracted] frequency values equal subtraction results of a predetermined value from the mixed [receive]

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receiving intermediate frequency band signals, and separating the sector signals to be extracted; and

a plurality of high frequency generating units for receiving the separated sector signals from the sector signal separating unit, mixing the separated sector signals into receive intermediate frequency band signals with signals having [subtracted] frequency value equal subtraction results of a predetermined value from a receive carrier frequency, converting the receive intermediate frequency band signals to [receive] the receiving carrier frequency [band] signals, and outputting the converted signals to the base station.

12. (Currently amended) The repeater according to claim 11, wherein the sector signal separating unit comprises:

a mixer for [receiving converted] extracting the multi-sector signals into the different [receive] receiving intermediate frequency band signals provided from the plurality of slave receiving units, for mixing the receiving intermediate frequency band signals into sector signals to be extracted with signals having [subtracted] frequency values equal subtraction results of a predetermined

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value from the [mixed receive] receiving intermediate frequency signals, and outputting the mixed signals; and

a band-pass filter for receiving the mixed signals from the mixer, performing band-pass filtering the mixed signal around the predetermined value into the sector signals, and separating the sector signals to be extracted.

13. (Currently amended) The repeater according to claim 11, wherein the high frequency generating unit comprises:

a mixer for receiving the separated sector signals from the sector signal separating unit, mixing the sector signals into receive intermediate frequency band signals with frequency signals having [subtracted] frequency values equal subtraction results of a predetermined value from a receive carrier frequency, converting the receive intermediate frequency band signals to [receive] the receiving carrier frequency band signals, and outputting converted signals; and an amplifier for amplifying the [receive] receiving carrier frequency band signals output from the mixer to a predetermined level.

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14. (Currently amended) Apparatus for transmitting sector signals in a multi-sector in-building repeater, the apparatus comprising:

a master transmitting unit for receiving multi-sector signals of a carrier frequency from a base station, mixing the multi-sector signals with different transmission intermediate frequency signals, and outputting the mixed multi-sector signals to a same transmission line;

a plurality of slave transmitting units, each of which receives the mixed multi-sector signals, for extracting sector signals assigned to the multi-sector signals from the [master transmitting unit] transmission line, converting the extracted sector signals into high frequency signals, and transmitting [converted] the high frequency signals through an antenna.

15. (Currently amended) The apparatus according to claim 14, wherein the master transmitting unit comprises:

a plurality of mixing units for receiving [assigned carrier frequency sector signals] the multi-sector signals of the carrier frequency from the base station,

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mixing the received [sector] multi-sector signals with the different transmission intermediate frequency signals, and outputting the mixed sector signals; and

a plurality of amplifying units for filtering off unnecessary signals [output signals of] from the mixed multi-sector signals outputted from the mixing units, [the sector signals having been converted into different transmission intermediate frequency signals,] for amplifying the [sector] filtered signals without the unnecessary signals to a predetermined level, and for outputting amplified signals to a same transmission line.

16. (Currently amended) The apparatus according to claim 15, wherein each of the mixing units comprises:

an attenuator for [receiving] extracting the multi-sector signals of the carrier frequency into high frequency sector signals of an assigned carrier frequency from the base station, attenuating the [received] high frequency sector signals, and outputting the attenuated high frequency sector signals;

and

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a mixer for mixing the attenuated [carrier] high frequency sector signals [at] received from the attenuator with signals having [subtracted] frequency values equal subtraction results of the different transmission intermediate frequency band signals from the carrier frequency, and outputting [converted sector] the mixed signals into the different transmission intermediate frequency band signals to each of the amplifying units.

17. (Currently amended) Apparatus for receiving sector signal in a multi-sector in-building repeater, the apparatus comprising:

a plurality of slave receiving units for mixing different receiving intermediate frequency signals with [the] sector signals of carrier frequencies received from [the] an antenna, converting the mixed signals into multi-sector signals of different receiving intermediate frequency bands, and outputting the converted [sector] signals to a same transmission line;

a master receiving unit for mixing the multi-sector signals [at] provided from the plurality of slave receiving units, the multi-sector signals having been transmitted through the same transmission line from the plurality of slave

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receiving units and converted into different receiving intermediate frequency band signals, with different intermediate frequency band signals, separating each of the [sector signals] different intermediate frequency band signals, converting the separated [sector] signals into receiving carrier frequency signals, and outputting the converted signals to [the] a base station;

a distributor for distributing received multi-sector signals to the plurality of [slave receiving] slave transmitting units, receiving [sector signals being converted into receiving intermediate frequency band signals] the multi-sector signals of different receiving intermediate frequency bands from the plurality of slave receiving units, and transmitting [converted sector signals] the multi-sector signals of different receiving intermediate frequency bands to the master receiving unit.

18. (Currently amended) The apparatus according to claim 17, wherein the slave receiving unit comprises:

an intermediate frequency generating unit for generating intermediate frequency signals by mixing [receive carrier frequency sector signals] the sector

signals of carrier frequencies provided through the antenna with the assigned
[receive] receiving intermediate frequency signals; and

an amplifier for filtering off the intermediate frequency signals generated
by the intermediate frequency generating unit, and amplifying the filtered
intermediate frequency signals to a predetermined level.

19. (Currently amended) The apparatus according to claim 18, wherein the
intermediate frequency generating unit comprises:

an amplifier for amplifying [receive carrier frequency sector signals] the
sector signals of carrier frequencies provided through the antenna to a
predetermined level;

a band-pass filter for filtering the [receive carrier frequency] sector
signals being amplified by the amplifier; and

a mixer for mixing the filtered [receive carrier frequency] sector signals
provided from the band-pass filter with signals having [subtracted] frequency
values equal subtraction results of the intermediate frequency signals from a
receive carrier frequency.

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20. (Currently amended) A method of providing signals from a base station to multiple sectors in a building utilizing a multi-sector in-building repeater, comprising:

attenuating and amplifying a plurality of sector signals of a carrier frequency received from the base station;

mixing each of the attenuated and amplified sector signals with corresponding different transmission intermediate frequency signals, and outputting each of the mixed sector signals to a same transmission line via a first duplexer;

distributing the mixed sector signals [of] received from the same transmission line to a plurality of slave transmitting units disposed at respective ones of the multiple sectors;

extracting sector signals in each of the multiple sectors from the mixed sector signals by utilizing different intermediate frequency signals assigned to respective ones of the slave transmitting units;

converting the extracted sector signals into high frequency signals, and transmitting the [converted] high frequency signals via a second duplexer through respective antennas, disposed within each of the multiple sectors.

21. (Currently amended) The method as set forth in claim 20, further comprising:

generating, in each of a plurality of slave receiving units, intermediate frequency signals by mixing receive carrier frequency sector signals provided through the antenna and the second duplexer, with assigned receive intermediate frequency signals;

outputting the intermediate frequency signals of each slave receiving unit to said first duplexer via said same transmission line;

converting the intermediate frequency signals of each slave receiving unit, [output] outputted by the first duplexer, to different carrier frequency signals for transmission to said base station.

REASONS FOR ALLOWANCE

3. Claims 1-21 are allowed.
4. References 6704298, 6052558 and 5930682 are additionally cited because they are pertinent to the claimed invention.

5. The following is an examiner's statement of reasons for allowance:

-Regarding to independent claim 1, none of prior art of record teaches or suggests a multi-sector in-building repeater in communication with a base station, the multi-sector in-building repeater comprising: a master transmitting unit for receiving multi-sector signals of a carrier frequency from the base station, mixing the multi-sector signals with different transmission intermediate frequency signals, and outputting the mixed multi-sector signals to a same transmission line; a plurality of slave transmitting units, each of which receives the mixed multi-sector signals, for extracting from the mixed multi-sector signals sector signals assigned to the multi-sector signals from the transmission line, converting the extracted sector signals into high frequency signals, and transmitting the high frequency signals through an antenna.

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-Regarding to independent claim 14, none of prior art of record teaches or suggests an apparatus for transmitting sector signals in a multi-sector in-building repeater, the apparatus comprising: a master transmitting unit for receiving multi-sector signals of a carrier frequency from a base station, mixing the multi-sector signals with different transmission intermediate frequency signals, and outputting the mixed multi-sector signals to a same transmission line; and a plurality of slave transmitting units, each of which receives the mixed multi-sector signals from the transmission line for conversions into high frequency signals, and transmitting the high frequency signals through an antenna.

-Regarding to independent claim 17, none of prior art of record teaches or suggests an apparatus for receiving sector signal in a multi-sector in-building repeater, the apparatus comprising: a plurality of slave receiving units for mixing different receiving intermediate frequency signals with sector signals of carrier frequencies received from an antenna, converting the mixed signals into multi-sector signals of different receiving intermediate frequency bands, and outputting the converted signals to a same transmission line; and a master

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receiving unit for mixing the multi-sector signals provided from the plurality of slave receiving units, the multi-sector signals having been transmitted through the same transmission line from the plurality of slave receiving units and converted into different receiving intermediate frequency band signals, with different intermediate frequency band signals, separating each of the different intermediate frequency band signals, converting the separated signals into receiving carrier frequency signals, and outputting the converted signals to a base station.

-Regarding to independent claim 20, none of prior art of record teaches or suggests a method of providing signals from a base station to multiple sectors in a building utilizing a multi-sector in-building repeater, comprising procedures of mixing each of a plurality of sector signals of a carrier frequency received from the base station with corresponding different transmission intermediate frequency signals, and outputting each of the mixed sector signals to a same transmission line; distributing the mixed sector signals received from the same transmission line to a plurality of slave transmitting units disposed at respective ones of the multiple sectors; extracting sector signals in

each of the multiple sectors from the mixed sector signals by utilizing different intermediate frequency signals assigned to respective ones of the slave transmitting units; converting the extracted sector signals into high frequency signals, and transmitting the high frequency signals through respective antennas, disposed within each of the multiple sectors.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sanh D. Phu whose telephone number is (571)272-7857. The examiner can normally be reached on M-Th from 7:00-17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew D. Anderson can be reached on (571) 272-

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4177. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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4/11/07

SP

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